



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/014,387	12/11/2001	Xu Ian Shi	GWS/18240CIP	1379

7590 07/14/2003
Kirschstein, Ottinger, Israel & Schiffmiller, P.C.
489 Fifth Avenue
New York, NY 10017-6105

EXAMINER

CANTELMO, GREGG

ART UNIT	PAPER NUMBER
----------	--------------

1745

DATE MAILED: 07/14/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/014,387

Applicant(s)

SHI ET AL.

Examiner

Gregg Cantelmo

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 15-21 is/are rejected.
- 7) ☒ Claim(s) 14 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 08/894,419.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Priority

1. This application is a continuation-in-part of prior Application No. 08/894,419, filed November 21, 1997, and abandoned on December 19, 2001.

Information Disclosure Statement

2. Since this application is a continuation application filed under 37 CFR 1.53 (b), the examiner has considered information, which has been considered by the Office in the parent applications. Such information need not be resubmitted in the continuing application unless the applicant desires the information to be printed on the patent.

Drawings

3. The drawings received December 11, 2001 are acceptable for examination purposes.

Specification

4. The disclosure is objected to because of the following informalities: the status of the parent application on page 1 of the instant application should be updated. Appropriate correction is required.

Art Unit: 1745

Claim Objections

5. Claim 2 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The raster scan pattern of claim 1 inherently scans from side to side in lines and from top to bottom and thus the scanning means of claim 1 must move the beam along two mutually orthogonal directions in a scan pattern to create a raster scan.

6. Claim 18 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 17 is an apparatus claim. Claim 18 is drawn to a process condition for simultaneous operation of the apparatus. There are no additional structural features recited in claim 18 to further define the apparatus and thus fails to further limit the structure of the claimed invention.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 1745

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 2, 9-11 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. patent No. 5,279,723 (Falabella).

Falabella discloses an apparatus for applying a coating of positive ions to a substrate having a coating area to be coated, the apparatus comprising: a) a vacuum chamber 34; b) a holder in the vacuum chamber for supporting the substrate 30; c) a filtered cathodic arc source 10 for directing a plasma beam containing the positive ions toward the substrate 30, the plasma beam having a cross-sectional beam area on the substrate which is smaller than the coating area on the substrate (col. 4, ll. 40-51); and d) scanning means for moving the beam in a raster scan across the substrate to coat the coating area (col. 4, ll. 40-51 as applied to claim 1).

A raster scan is one which scans from side to side in lines from top to bottom on a surface and thus scans the beam along two mutually orthogonal directions in a scan pattern (col. 4, ll. 40-51 as applied to claim 2).

The cathodic arc source includes a cathode 2 which is replaced with a new cathode when the first cathode is used up. Thus the cathode source is interchangeable (as applied to claim 9).

An electrical DC bias is applied to the substrate (workpiece, col. 3, ll. 53-68 as applied to claims 10 and 11).

Falabella discloses an apparatus for applying a coating of positive ions to a substrate having a coating area to be coated, the apparatus comprising: a) a

Art Unit: 1745

vacuum chamber 34; b) a holder in the vacuum chamber for supporting the substrate 30; c) a filtered cathodic arc source 10 for directing a plasma beam containing the positive ions toward the substrate 30, the plasma beam having a cross-sectional beam area on the substrate which is smaller than the coating area on the substrate(col. 4, ll. 40-51); and d) scanning means for moving the beam in a raster scan across the substrate to coat the coating area, a raster scan is one which scans the beam in both an x and y direction across the substrate (col. 4, ll. 40-51 as applied to claim 20).

9. Claim 20 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. patent No. 5,433,836 (Martin).

Martin discloses of an apparatus for applying coating of positive ions to a substrate having a coating area to be coated, the apparatus comprising: a vacuum chamber, a holder in the vacuum chamber (not shown) for supporting the substrate 8; a cathodic arc source 1 for directing a plasma beam containing the positive ions towards the substrate, scanning means 9, wherein the scanning means comprises means for scanning the beam, such as widening the beam as shown in Fig. 1, to coat the substrate coating area. By widening the beam, the cross-section of the beam is divergent (as shown in Fig. 1) in both an x and y direction in order to provide plasma beam which completely contacts the substrate 8 (as applied to claim 20).

Art Unit: 1745

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Falabella in view of U.S. patent No. 5,571,331 (Schertler).

The teachings of claims 1 and 20, with respect to Falabella, have been discussed above and are incorporated herein.

The differences between Falabella and claims 3-5 are that Falabella does not disclose of the holder being a rotary drum holder (claim 3) with the substrates mounted on a peripheral surface of the drum (claim 4) or of the holder being moveable and further comprising a plurality of additional substrates mounted on the movable holder (claim 5).

Schertler discloses that a rotary drum holder for holding plural substrates is known in the art (Figs. 3-6). The rotary drum holder 15 holds substrates 11. The assembly is movable past coating sources 25 (Fig. 6).

The arrangement provides flexibility for conveying the workpieces to the various coating stations and furthermore to process plural substrates in a single coating process without breaking vacuum during coating (see col. 3, ll. 18-36 and col. 4, ll. 51-60).

Art Unit: 1745

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Falabella by using a rotary drum holder for holding plural substrates since it would have provided flexibility for conveying the workpieces to the various coating stations and furthermore processed plural substrates in a single coating process without breaking vacuum during coating.

12. Claims 6, 7 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Falabella in view of the admitted prior art relied upon in the instant application.

The teachings of claims 1 and 20, with respect to Falabella, have been discussed above and are incorporated herein.

Falabella discloses using a magnetic coil means for scanning the plasma beam in a raster pattern.

The differences between Falabella and claims 6, 7 and 21 are that Falabella does not disclose the particular scanning frequency conditions of claims 6, 7 and 21.

The instant application discloses that scanning the plasma using magnetic means is known in the art and uses an example frequency of 2-100 Hz (page 5, 3rd paragraph of the specification). Applicant appears to admit that scanning is within the skill of the artisan and hence obvious (applied to claims 34-36 and 40-41).

Art Unit: 1745

Selection of any scanning frequencies which can provide a raster pattern for coating the substrate would have been an obvious modification to one of ordinary skill in the art.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Falabella by selecting the scanning frequencies to be under the conditions set forth in claims 6, 7 and 20 since they would have been obvious operating parameters known and appreciated in the art for providing a raster scanning pattern to a plasma beam in an cathodic arc source for coating substrates. Further appears that the specific cm dimensions of the coating areas are not critical but preferred with respect to the instant invention).

13. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Falabella in view of U.S. patent No. 5,103,766 (Yoshikawa).

The teachings of claim 1, with respect to Falabella, have been discussed above and are incorporated herein.

The differences between Falabella and instant claim are that Falabella does not disclose providing an additional filtered cathodic arc source (FCA) for directing additional plasma toward the substrate, the second plasma beam having a cross-sectional beam area on the substrate smaller than the coating area of the substrate and scanning the beam in a raster pattern across the substrate to coat the coating area on the substrate with and additional coating (claim 8).

Art Unit: 1745

Yoshikawa discloses a vacuum arc deposition system wherein plural arc deposition sources are provided to coat a centralized substrate on a rotating table 10 (Fig. 1).

Providing plural cathode sources of different materials permits the deposition of multiple layers on substrate without breaking vacuum during the multilayer deposition process (Figs. 1 and 4 col. 4, ll. 38-45).

The motivation for using additional FCAs is that it permits the deposition of different materials in a multilayer stack on a substrate without breaking vacuum. By not breaking vacuum, contamination of the film is additionally reduced.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Falabella by providing additional FCAs since it would have permitted the deposition of different materials in a multilayer stack on a substrate without breaking vacuum. By not breaking vacuum, contamination of the film would have further been reduced.

14. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Falabella in view of Yoshikawa as applied to claim 12 above, and further in view of U.S. patent No. 3,676,320 (Christensen).

The difference not yet discussed is of the substrate being dielectric and the bias being an RF bias applied to the substrate.

Yoshikawa teaches that an RF bias can be applied to the substrate (col. 3, ll. 48-58).

Art Unit: 1745

One of ordinary skill in the art would have known that the selection of the bias RF or DC can be selected relative to the material of the substrate.

Generally a DC bias is applied to metal substrates whereas an RF bias is applied to dielectric materials to eliminate charge accumulation on the substrate and provide a uniform bias at the surface of the substrate (see Christensen paragraph bridging columns 1 and 2).

The motivation for using an RF bias to a substrate is useful for insulating (dielectric) substrates since it eliminates charge accumulation on the substrate and provides a uniform bias at the surface of the substrate.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Falabella by using an RF bias to a substrate is useful for insulating (dielectric) substrates since it would have eliminated charge accumulation on the substrate and provided a uniform bias at the surface of the substrate.

15. Claims 12, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Falabella in view of U.S. patent No. 5,234,561 (Randhawa) and U.S. patent No. 3,676,320 (Christensen).

The teachings of claim 1, with respect to Falabella, have been discussed above and are incorporated herein.

The differences between Falabella and instant claims 12, 15 and 16 are that Falabella does not disclose of applying an RF bias to the substrate (claims 12, 15 and 16) of the substrates being dielectric (claims 15 and 16) of the substrate being an optical element (claim 16).

Randhawa teaches that either a DC or RF bias can be applied to the substrate in a cathodic arc deposition system and process.

The motivation for applying a bias to the substrate is to permit ion bombardment of the substrate during coating and to enhance the movement of the target atoms toward the substrates and/or to effect the characteristics of the depositing film.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Falabella by selecting an RF bias to the substrates since it would have permitted ion bombardment of the substrate during coating and to enhanced the movement of the target atoms toward the substrates and/or effected the characteristics of the depositing film.

With respect to claim 15:

It is known in the art to apply a substrate bias, either RF or DC. The motivation for applying a bias to the substrate is to permit ion bombardment of the substrate during coating and to enhance the movement of the target atoms toward the substrates and/or to effect the characteristics of the depositing film.

One of ordinary skill in the art would have known that the selection of the bias RF or DC can be selected relative to the material of the substrate.

Generally a DC bias is applied to metal substrates whereas an RF bias is applied to dielectric materials to eliminate charge accumulation on the substrate and provide a uniform bias at the surface of the substrate

Art Unit: 1745

Selection of the substrate to be a dielectric material is a matter of choice affected by the desired product to be manufactured. In selecting a dielectric substrate, and applying a bias thereto, one of ordinary skill in the art would have selected an RF bias application over DC to eliminate charge accumulation on the substrate.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Falabella by selecting a dielectric substrate since selection of the substrate is merely matter of choice affected by the desired product to be manufactured. Selection of the RF bias then would have been obvious since it would have eliminated charge accumulation on the substrate.

With respect to claim 16:

"Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim." Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969). Furthermore, "[i]nclusion of material or article worked upon by a structure being claimed does not impart patentability to the claims." In re Young, 75 F.2d 966, 25 USPQ 69 (CCPA 1935) (as restated in In re Otto, 312 F.2d 937, 136 USPQ 458, 459 (CCPA 1963)). In In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967) Note that this line of cases is limited to claims directed to machinery which works upon an article or material in its intended use. It does not apply to product claims

Art Unit: 1745

or kit claims (i.e., claims directed to a plurality of articles grouped together as a kit). See MPEP § 2115.

Selection of the substrate is dependent upon the manufacturing process.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Falabella by selecting the substrates to be a dielectric substrate and further an optical element

16. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Falabella in view of U.S. patent No. 5,480,527 (Welty).

The teachings of claim 1, with respect to Falabella, have been discussed above and are incorporated herein.

The difference between Falabella and instant claim 13 is that Falabella does not disclose of a plasma duct having two bends.

Welty discloses of an FCA having two bends (Fig. 4).

The motivation for using the FCA duct of Welty is that it provides enhanced filtering of macroparticles from the plasma beam.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Falabella by using the double bend plasma duct of Welty since it would have enhanced filtering of macroparticles from the plasma beam.

17. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Falabella in view of U.S. patent No. 5,571,331 (Schertler).

Falabella discloses an apparatus for applying a coating of positive ions to a substrate having a coating area to be coated, the apparatus comprising: a) a

Art Unit: 1745

vacuum chamber 34; b) a holder in the vacuum chamber for supporting the substrate 30; c) a filtered cathodic arc source 10 for directing a plasma beam containing the positive ions toward the substrate 30, the plasma beam having a cross-sectional beam area on the substrate which is smaller than the coating area on the substrate(col. 4, ll. 40-51); and d) scanning means for moving the beam in a raster scan across the substrate to coat the coating area (col. 4, ll. 40-51 as applied to claims 17 and 19).

Note that claim 18 does not further define the apparatus of claim 17 since it merely recites a manner of simultaneously operating the apparatus of claim 17. The process conditions therein have not been accorded patentable weight with respect to the apparatus as claimed.

The differences between Falabella and claims 17 and 19 are that Falabella does not disclose an apparatus comprising a holder for supporting a plurality of substrates (claims 17 and 19), a plurality of FCAs (claim 17), drive means for moving the holder relative to the beams (claims 17 and 19).

Schertler discloses that a rotary drum holder for holding plural substrates is known in the art (Figs. 3-6). The rotary drum holder 15 holds substrates 11. The assembly is movable past coating sources 25 (Fig. 6).

The arrangement provides flexibility for conveying the workpieces to the various coating stations and furthermore to process plural substrates in a single coating process without breaking vacuum during coating (see col. 3, ll. 18-36 and col. 4, ll. 51-60).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Falabella by using a rotary drum holder for holding plural substrates since it would have provided flexibility for conveying the workpieces to the various coating stations and furthermore processed plural substrates in a single coating process without breaking vacuum during coating.

Allowable Subject Matter

18. Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

19. The following is a statement of reasons for the indication of allowable subject matter: none of the prior art of record is considered to teach, suggest or render obvious the invention of claim 14.

Claim 14 recites that the cathodic arc source includes a duct having two bends wherein one of the bends lies in a first plane and the other of the bends lies in a second plane, and further wherein the planes are not coincident.

Martin and Falabella each disclose a cathodic arc source including a duct having a single bend. And neither reference teaches or suggests a duct having two bends in the manner recited in claim 14.

The advantage of a duct having two bends is to not only prevent a line of sight path between the target and substrate but additionally to prevent a single


Art Unit: 1745

bounce path from the target to the substrate (see page 15 of the disclosure of the instant application).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (703) 305-0635. The examiner can normally be reached on Monday through Thursday from 8:00 a.m. to 5:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan, can be reached on (703) 308-2383. FAX communications should be sent to the appropriate FAX number: (703) 872-9311 for After Final Responses only; (703) 872-9310 for all other responses. FAXES received after 4 p.m. will not be processed until the following business day. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gregg Cantelmo
Patent Examiner
Art Unit 1745

gc

July 8, 2003